Letters to the Editor

Infectious Waste Management-Will Science, Common Sense and Cost-Benefit Prevail?

To the Editor:

I would like to add some comments to the excellent editorial on infectious waste management written by E.R. Hedrick in the November *1988* issue of *Infection Control & Hospital Epidemiology*. If my American infection control friends believe they have problems with infectious waste management, I would like to invite them to Germany.

West Germany, with a large population in an area smaller than Texas, is filled with household and hospital waste. Many West German hospitals export their hospital waste to France, Austria, East Germany, etc. In a few years, we probably will try to export our hospital waste to the United States and I am sure we will pay a tremendous amount of money for it.

The University Hospital in Freiburg has to incinerate its infectious waste in Ulm. Therefore, we have to transport our infectious waste (300 km one way) in special disposable containers on special trucks several times a week at the cost of 2,350 German marks per ton for incineration and another 1,000 German marks per ton for transportation.

In Germany we now have what is called "waste tourism." We started several scientific and administrative activities to reduce the amount of infectious as well as total hospital waste :

- We convinced city councils, health authorities and infectious disease specialists, which was sometimes rather difficult, that hospital waste contains less bacteria than household waste. Therefore, special precautions such as disposable containers (except for sharps) or expensive impermeable plastic bags for transportation and special precautions for disposing of hospital waste are unnecessary.
- We and others have demonstrated that not more than 3% to 5% of the total hospital waste is infectious. Disinfection by heat is much less expensive than incineration. Following disinfection by heat, the infectious waste can be disposed of in a sanitary landfill.
- We started a research project to reduce hospital waste while keeping the same hygiene standard. A considerable part of the 2,000 tons of waste per year in our hospital is produced as a result of infection control procedures. Some of our research findings and recommendations are summarized in Table 1. We try to replace disposables with reusable material. The cost-benefit studies that favor disposables almost never include the increasing costs for collection, transportation or incineration of disposables. Disposables are usually very bulky; hospitals not only pay for the weight, but also for the volume of waste.

Table 1
Cost Reduction by Waste Control

Examples from the research project "Reduction of Hospital Waste-Identrcal Hygiene Standard," Department of Hospital Epidemiology, University Hospital Freiburg, West Germany, Supported by the Ministry for Environment, Baden-Württemberg)

- Reduction of disposables
- Resterilization of expensive and toxic disposables
- Reduction of surface disinfectants (e.g., phenolics)
- Recycling of hospital waste (glass, paper, plastic, metal)
- Reduction of temperature and chemicals for washing hospital linen
- Reduction of toxic cleaning substances (chlorides, phosphates, acids, tensides. etc.)
- Reduction of packing material (especially polyvinylchlorides)

Scientific evidence that disposables decrease nosocomial infection rates is still lacking. Examples of unnecessary disposables are given in Table 2.

Autoclavable ventilation tubes are much more expensive to buy, but in the long run are several times more cost effective than disposable ventilation tubes. It is a sin to replace reusable suction systems with disposable ones. It takes several liters of oil to incinerate a disposable plastic bag filled with tracheal secretion from an infected patient. Several months ago we started a pilot project to recycle hospital waste such as glass, paper, plastic and metal. It is simply thoughtless to buy expensive and bulky disposable containers to collect sharps such as needles and syringes when, at the same time, hundreds of plastic bottles that could be used for sharps collection are thrown away everyday in a hospital. We estimate that approximately half of our hospital waste could be recycled. This is especially true for waste in operation theaters and intensive care units, where many disposables are used and therefore

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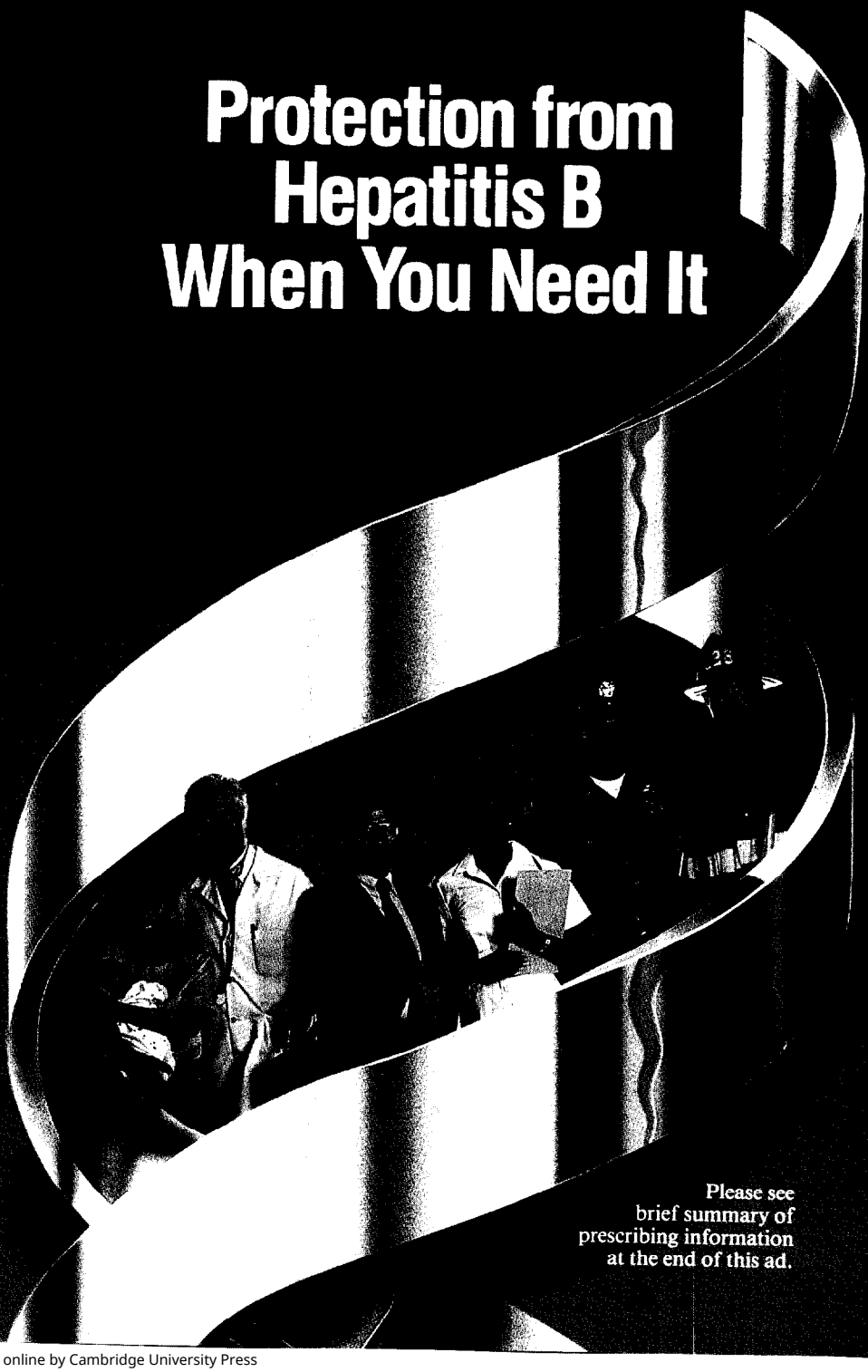

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New 20 mcg Recombinant Dose

	Engerix-B*	Recombivax HB®†
Adult dose (mcg)	20	10
Standard dosing regimen (0, 1 and 6 months)	Yes	Yes
New 0, 1, 2 month dosing regimen*‡ for certain populations	Yes	No
Published efficacy data: Neonates born of infected mothers[1]	Yes	Yes
VACTRAC™-computer software for vaccination tracking and compliance	Yes	No
Bar-coded, unit-dose vials	Yes	No
Lowest cost per dose[2]	Yes	No

*For those recently exposed to the virus (including needlestick exposure), certain travelers to high-risk areas, and neonates born of infected mothers.
†Hepatitis B Vaccine (Recombinant), MSD.
‡When prolonged maintenance of protective antibody titers is desired, a booster dose at month 12 is recommended.

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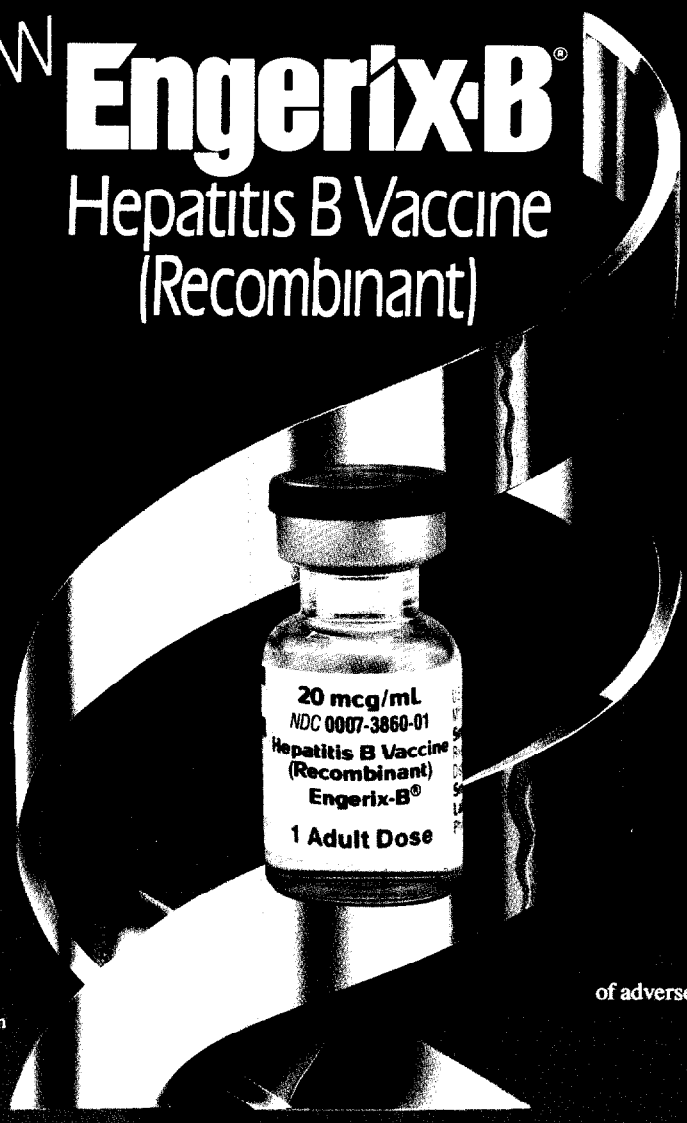

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*Please see brief summary of prescribing information at the end of this ad for a complete listing of adverse reactions, contraindications, warnings and precautions.

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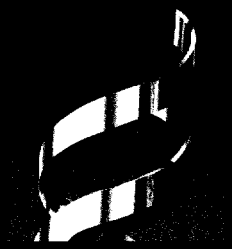
Hepatitis B Vaccine (Recombinant)



Protection from Hepatitis B When You Need It

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*For those recently exposed to the virus (including needlestick exposure), certain travelers to high-risk areas, and neonates born of infected mothers.

Engerix-B®

Hepatitis B Vaccine (Recombinant)

Sea complete prescribing **information** In **SK&F** literature or ***PDR***. The **following** Is **a brief summary.**

INDICATIONS AND USAGE: 'Engerix-B' Is indicated for immunization against infection caused by all known subtypes of hepatitis B virus Immunization Is recommended In persons of all ages, especially those who are, or will be at increased risk of exposure to hepatitis B virus

CONTRAINDICATIONS: Hypersensitivity to yeast or any other component of the vaccine Is a contraindication for use of the vaccine

WARNINGS: Do not give additional injections to patients experiencing hypersensitivity after an Engerix B' injection (See CONTRAINDICATIONS)

Hepatitis B has a long incubation period Hepatitis B vaccination may not prevent hepatitis B infection in individuals who had an unrecognized hepatitis B infection al the time of vaccine administration Additionally, it may not prevent infection in individuals who do not achieve protective antibody titers

PRECAUTIONS: General: As with any percutaneous vaccine, keep epinephrine available for use in case of anaphylaxis or anaphylactoid reaction

As with any vaccine, delay administration, if possible, in persons with any febrile illness or active infection

Pregnancy: Pregnancy Category C Animal reproduction studies have not been conducted with 'Engerix-B' It is also not known whether Engerix B can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity Give 'Engerix B' to a pregnant woman only if clearly needed

Nursing Mothers: It is not known whether 'Engerix B' is excreted in human milk Because many drugs are excreted In human milk, use caution when giving Engerix B' 10 a nursing woman

Pediatric Use: 'Engerix B' has been shown lo be well tolerated and highly immunogenic in infants and children of all ages Newborns also respond well, maternally transferred antibodies do not interfere with the active immune response lo the vaccine

ADVERSE REACTIONS: Engerix-B' is generally well tolerated During clinical studies involving over 10,000 individuals distributed over all age groups, no serious adverse reactions attributable to vaccine administration were reported As with any vaccine. however it is possible that expanded commercial use of the vaccine could reveal rare adverse reactions not observed in clinical studies

Ten double blind studies involving 2,252 subjects showed no significant difference in the frequency or severity of adverse experiences between 'Engerix B and plasma derived vaccines In 36 clinical studies a total of 13,495 doses of 'Engerix B' were administered to 5 071 healthy adults and children who were initially seronegative for hepatitis B markers and healthy neonates All subjects were monitored for 4 days post-administration Frequency of adverse experiences tended lo decrease with successive doses of 'Engerix B' Using a symptom checklist * the most frequently reported adverse reactions were injection site soreness (22%) and fatigue* (14%) Other reactions are listed below

Incidence 1% to **10% of** Injections: Induration erythema; swelling. fever (> 37 5°C); headache', dizziness *

'Parent or guardian completed forms for children and neonates Neonatal checklist did not include headache, fatigue or dizziness

Incidence < 1% of Injections: Pain; pruritus; ecchymosis sweating malaise; chills; weakness, flushing, tingling hypotension; influenza like symptoms; upper respiratory tract illnesses; nausea; anorexia abdominal pain/cramps vomiting, constipation; diarrhea lymphadenopathy; pain/stiffness in arm, shoulder or neck arthralgia myalgia; back pain; rash urticaria; petechiae; erythema; somnolence, insomnia irritability, agitation

Additional adverse experiences have been reported with the commercial use of 'Engerix B' outside the United Slates Those listed below are to serve as alerting information lo physicians Anaphylaxis erythema multiforme including Stevens Johnson syndrome. angioedema; arthritis; tachycardia/palpitations bronchospasm including asthma-like symptoms, abnormal liver function tests migraine; syncope paresis neuropathy including hypoesthesia paresthesia, Guillain Barre syndrome and Bell's palsy, transverse myelitis; thrombocytopenia, eczema purpura herpes zoster; vertigo conjunctivitis keratitis; visual disturbances

Potential Adverse *Experiences In* addition certain other adverse experiences not observed with 'Engerix B' have been reported with Heptavax B® † and/or Recombivax HB® ‡ Those listed below are to serve as alertinginformation to physicians Optic neuritis

HOW SUPPLIED: 20 mcg/mL in Single Dose Vials in packages of 1 10 and 25 vials

NDC 0007-3860 01 (package of 1)
NDC 0007-3860 11 (package of 10)
NDC 0007-3860 16 (package 0125)

10 mcg/0 5 mL in Single Dose Vials in packages of 1 vial

NDC 0007-385901 (package of 1)

† plasma dewed, Hepatitis B Vaccine, MSD
‡ yeast dewed. Hepatitis B Vaccine, MSD

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Date of issuance Aug 1989

BRS--EB L6 EB901

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1. **Poovorawan** Y, **Sanpavat S, Pongpunlert W,** et al: Protective efficacy of a recombinant DNA hepatitis B vaccine in neonates **of HBe** antigen-positive mothers. JAM.4 1989; **261(22):3278-3281. 2.** Based on published prices, **August** 1989.

Table 2
Expensive Disposables That Unnecessarily Increase Volume of Hospital Waste

- Disposable ventilation tubes
- Disposable pleural drainage systems
- Disposable suction systems
- Disposable redon drainage bottles
- Disposable drainage bags
- Disposable ventilation filters
- Disposable gowns and drapes
- Disposable plastic dressings
- Disposable lumbar, liver, etc. puncture systems
- Disposable scissors and forceps
- Disposable dishes

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a huge amount of packing material can be collected daily.

I think it is time that hospital epidemiologists consider the pollution of the environment as a result of the daily infection control activities. It is our experience that cooperation of the hospital personnel in nosocomial infection control has improved since we pay more attention to our environment.

F.D. Daschner
Freiburg, West Germany

Ceiling Maintenance-Why?

To the Editor:

Ceiling maintenance traditionally has been an ignored subject because of the "out of sight--out of mind" syndrome. Preventative maintenance has been limited to painting, further complicating the situation. But this 25% of the room cube probably has more effect on room environment and its occupants than all of the rest of the room put together.

A room's walls usually are made of a hard, generally nonporous material like painted sheet rock or a high density vinyl covering. The floors are similar, with a tile or masonry surface. Carpets are worse because they are not as easily cleaned. Ceilings are usually made of an absorbent material, like mineral based tiles or a plaster spackling. Both of these materials are highly absorbent, with their primary purpose being absorption of sound. The remaining articles in a room are generally furniture or equipment, again made of mostly low absorbency materials.

Now look at Mother Nature's affect. Hot air rises. Not new news, but look at what travels with it. Every person who enters a room leaves some of him or herself and the germs, bacteria, dirt and anything else he or she is carrying in that room. The room itself also contributes through organic deterioration of plants and materials it houses. This is then swept to the ceiling. It should really be called a sponge because it absorbs and retains a little of it all. Then Mother Nature comes into play again. Air circulating in the room picks up and recirculates some of these accumulated "goodies," and the cycle goes on.

People, in their efforts to achieve energy conservation, now add the clincher. Engineering technology has allowed the economical building of tighter buildings. This in turn has reduced air infiltration that tended to dilute indoor air pollution in the past. Now this pollution accumulates and concentrates and is further absorbed in surfaces like ceilings.

What is the effect of all of this? The Environmental Protection Agency (EPA) has found that air pollution is as much as 70 times worse indoors than outdoors in the most polluted cities in the United States. More than 900 individual substances in a single category, volatile organic compounds, have been identified in indoor air, including pesticides, carbon monoxide, formaldehyde and radon gas. The health considerations are important and have long-term legal ramifications.

Even though we have only scratched the surface of the adverse physical health effects of indoor air pollution, there are other considerations. A ceiling generally takes from five to nine years to accumulate enough "hard material" to become aesthetically detracting. Usually after one to two years, a ceiling can be cleaned and produce a noticeable difference in color.

New discoloration takes place gradually and plays a negative role. Rooms begin to get darker with the resulting lower lighting levels and begin to "close in," having unmeasured psychological effects on reduced productivity, attendance, customer attitudes and general behavioral attitudes. The accumulated germs and bacteria in the ceilings also produce a gradual "odor" in the room which has unmeasured effects on the occupants. Research on the effects of indoor air pollution is incomplete, but tends to indicate that the effects could be far reaching on both the physical and mental health of the building occupants.

Indoor air pollution is a subject that is going to have to be addressed on several fronts. Long-term answers must come from the heating and air conditioning industry. The "sick building" syndrome is being addressed through university research and major technical societies, like the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), are addressing the problem through industry research and new technology implementation. Short-term answers will have to be addressed through more active maintenance.

Ceiling maintenance has traditionally been low priority because the primary concern has been aesthetics. Maintenance is important because of the image that either a dirty or clean ceiling creates. The